It's Not Suppo To Work Like T

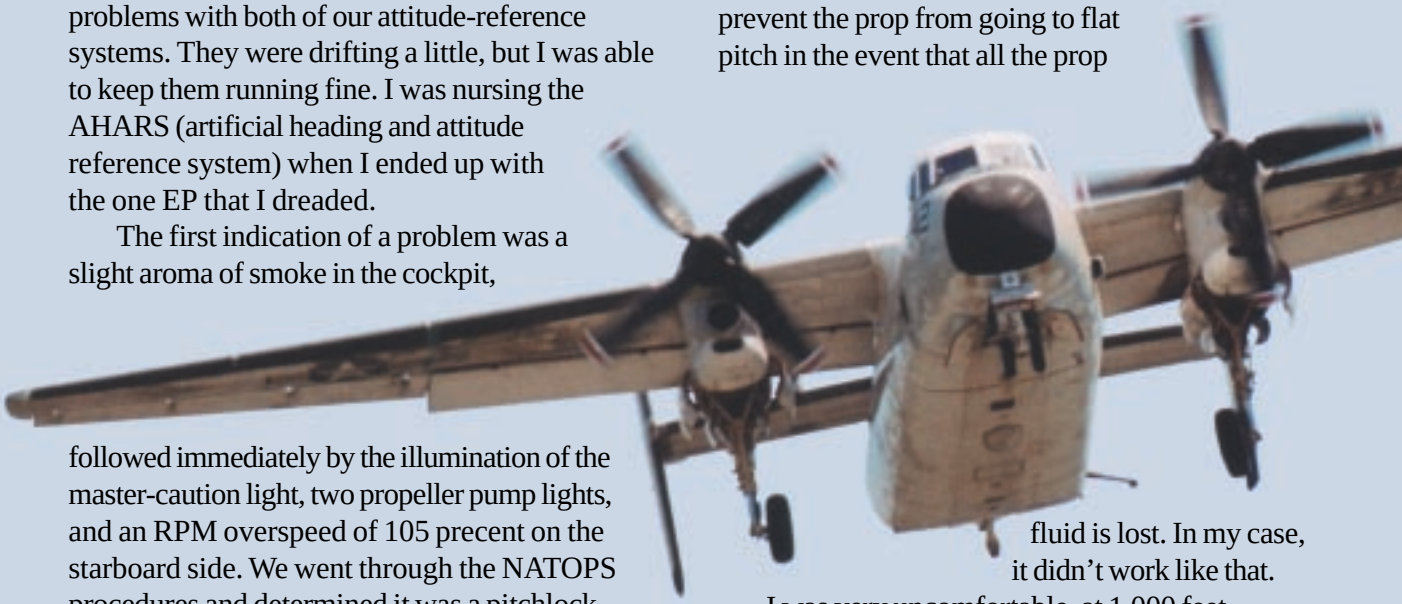
by Lt. Bill Hammack

It started out as a normal day at the E-2/C-2 RAG: brief an FCLP event and head out for a long day in the pattern, trying to help students figure out how to fly the ball. We launched and left Navy Norfolk for a three-to-four-hour flight.

The weather wasn't bad—a broken layer at 1,800 feet—so we needed only a little help from Oceana approach to get into NALF Fentress. After the first part of the period, we started having problems with both of our attitude-reference systems. They were drifting a little, but I was able to keep them running fine. I was nursing the AHARS (artificial heading and attitude reference system) when I ended up with the one EP that I dreaded.

The first indication of a problem was a slight aroma of smoke in the cockpit, followed immediately by the illumination of the master-caution light, two propeller pump lights, and an RPM overspeed of 105 precent on the starboard side. We went through the NATOPS procedures and determined it was a pitchlock, and a really bad one at that. I took the controls from the student and was shocked to find that I was losing directional control of the aircraft. Normal V_{mca} is about 100 knots with one engine out in a COD, but we were at 130 knots, and we still had both engines on line (even if one wasn't working correctly). To make matters worse, with full power on the good engine, airspeed and altitude were winding down.

C-2s and E-2s have a pitchlock system built into the propellers to "help" the pilot if a propeller loses hydraulic fluid. Unlike the T-34, which has a spring assembly that will drive the prop to feather in the event of a failure, the C-2 and E-2 need hydraulic pressure inside the prop to drive the prop to feather. The pitchlock system is supposed to prevent the prop from going to flat pitch in the event that all the prop fluid is lost. In my case, it didn't work like that.



I was very uncomfortable, at 1,000 feet, without directional control and in a shallow descent. The only way to regain control of the aircraft was to pull power on the good engine (just like they teach you in the training command). By pulling power on the good engine, V_{mc} air was decreased to a point we could regain directional

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control. The problem then became that without full power on the operating engine, I was picking up a rate of descent with nothing but trees below us. We could arrest the rate of descent with power, but that just put us back where we started with V_{mc} issues.

As I looked out at the nacelle, I was surprised to see how much hydraulic fluid was out there. All my indications led me to believe that I had a propeller stuck at the low-pitch stops (flat blade, the worst-case scenario). If an engine flames out with a propeller stuck at the low-pitch stops, the COD doesn't have enough power on the remaining engine to stay flying. I started making a plan to ditch the aircraft in the event of a flameout.

Going through the NATOPS was no help. Basically, it told me I wasn't "operating in accordance with recommended pitchlock procedures." That was great information, as I was trying to maintain directional control, barely maintaining altitude, and had a student sitting next to me. NATOPS was telling us the propeller system isn't supposed to work like that, so we were on our own. It did, however, tell us to expect an increased V_{mca} of about 130 knots. We verified that fact several times as our airspeed varied between 127 and 130 knots. As advertised, we would lose directional control at about 129 knots. NATOPS recommended we maintain 10 knots above V_{mc} until landing is assured, but that wasn't possible.

We went through the checklists and did a quick, side-to-side seat swap. I was concerned that I was either going to have to ditch the aircraft or would have controllability problems on deck. In the left seat, I'd at least have the nosewheel steering available for the rollout. We had already declared an emergency to paddles, and all of the Hawkeyes were up in the delta pattern to watch the show.

We put the hook down, and I briefed my student to have his hand on the T-handle to try to feather the engine if I called for it. This is a big deviation from NATOPS. We teach never to T-handle a pitchlocked engine, because you might end up with a flat blade. I figured that I was already as bad off as I could get, so if the engine shut down on its own, I wouldn't have anything to lose.

We made the turn to final and got into the wire without a problem. I thought I was done until the aircraft swerved toward the right side of the runway. I told the student to feather the engine, and we came to a stop in the wires. After all was said and done, the prop feathered. It wasn't supposed to, according to all of our training and systems knowledge, but it did.

After talking to our maintenance department, it turned out the nut that holds the propeller assembly together had backed off. After the nut failed, all of the hydraulic fluid that controls the propeller-pitch-change mechanism dumped. It was such a rapid and massive failure that the pitchlock system didn't have time to kick in.

NATOPS doesn't cover all possible emergencies. When you're faced with a situation that isn't covered, fall back on your systems knowledge. NATOPS allows an aircraft commander to override what is published, in the event things aren't acting as advertised, or you're dealing with something out of the norm. Good systems knowledge, crew coordination, and a little help from paddles kept this EP from causing the loss of aircrew or aircraft.

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